

PHYS 424: Particle Physics  
January 2014 - April 2014

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**Lectures:** 10:30 - 11:50, Tuesday and Fridays, in Elliott 160  
First lecture: Tuesday 7 January 2014.

**Course web:** [moodle.uvic.ca](http://moodle.uvic.ca)

**Text:** Introduction to Elementary Particles, 2nd edition, David Griffiths.  
There is one copy in the Library Reserve, call number "pri 16779".

<b>Office Hours:</b> Elliott 205A	Tuesdays	14:30 - 16:30
	Wednesdays	14:30 - 15:30

**Keys to success**

- Attend lectures.
- Read the text.
- Do assignments.
- Work on your project.

**Course material**

Course material will be distributed via the University's [moodle.uvic.ca](http://moodle.uvic.ca) web site. This includes any slides shown in class, a detailed probable schedule of lectures and associated readings, and notes pointing to other useful resources.

**Topics covered**

This course will be an overview of particle physics, leading to topics of current research interest, such as CP violation, the Higgs boson, neutrino oscillations, and physics beyond the Standard Model. The course will start with an overview of elementary particle dynamics, followed by a review of special relativity. We will then discuss symmetries, including a review of angular momentum in quantum mechanics. We will then address the calculation of decay rates and scattering cross sections through the use of the Feynman diagrams. This will then be applied to quantum electrodynamics, quantum chromodynamics, and the weak interaction. Next we will discuss gauge theories and the structure of the Standard Model of particle physics, including the role of the Higgs boson. If time permits, we will close with a discussion of neutrino oscillations and physics beyond the Standard Model.

**Required course**

Prerequisite: PHYS 423 or permission from the Department.  
If you do not satisfy this requirement, please contact the instructor.

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### Marking and Grades

To obtain credit in the course you must attempt and submit material for all evaluated components, and have at least 50% on your final mark which is obtained with the following marking scheme:

Assignments	30%	approximately 6 or 7 assignments
Project	30%	slides and presentation components
Final exam	40%	3 hour exam, April Exam Period

The final grade follows the Physics and Astronomy scheme for conversion of numerical scores to letter grades as closely as possible:

A+	90-100	B+	77-79	C+	65-69	F	0-49
A	85-89	B	73-76	C	60-64		
A-	80-84	B-	70-72	D	50-59	N	Not Complete

If the application of this scheme would result in grades that are judged by the instructor to be inconsistent with the University's grading guidelines (to be found on page 38 of the current Undergraduate Calendar), then the instructor will use the University guidelines. Supplemental exams are not offered for this course, and hence the grade E will not be assigned. The grade N is a failing grade that indicates that you did not complete the required course work.

### Calculator

You may only use a non-programmable, non-graphing calculator for exams. Examples of acceptable calculators are the Sharp EL-510R or EL-510RNB; they can be bought in the UVic Bookstore for about \$10.

### Arrangements and Conduct

The instructor is willing to arrange reasonable accommodations for:

- missed exams due to illness or severe affliction;
- missed assignments or course deadlines due to illness or other affliction;
- conflicts between classes or examinations, and religious observances;
- issues documented through RCSD;
- other issues.

If you miss an exam for any reason, you are expected to contact the instructor as soon as possible after the exam. If you anticipate missing a course requirement, you are expected to contact the instructor a reasonable amount of time in advance.

Cheating, plagiarism, and other forms of academic fraud are taken very seriously by the University and by the instructor. Please familiarize yourself with the *Policy on Academic Integrity* which can be found in the Undergraduate Calendar on pages 32-34, or online: <http://web.uvic.ca/calendar2013/FACS/UnIn/UARe/PoAcI.html>

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**Final Exam**

You can bring your textbook, assignments and personal notes to the final exam. Make sure you have your textbook for the exam.

**Tentative Schedule (last update 7 Mar 2014)**

<b>Date</b>	<b>Lecture Title</b>	<b>Text reference</b>
Jan 7	Introduction	Chapter 1
Jan 10, 14	Elementary Particle Dynamics	Chapter 2
Jan 17, 21, 24	Relativistic Kinematics	Chapter 3
Jan 28, 31	Symmetries	Chapter 4
Feb 4, 7	Symmetries	Chapter 4
Feb 10-14	READING BREAK	
Feb 18, 21, 25	The Feynman Calculus	Chapter 6
Feb 28	Quantum Electrodynamics	Chapter 7
Mar 4, 7, 11	Quantum Electrodynamics	Chapter 7
Mar 14, 18	Quantum Chromodynamics	Chapter 8
Mar 21	Weak Interactions	Chapter 9
Mar 25	Gauge Theories and the Standard Model	Chapter 10
Mar 28	Project presentations	
Apr 1, 4	Project presentations	